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## X.

CONTRIBUTIONS FROM THE CRYPTOGAMIC LABORATORY  
OF HARVARD UNIVERSITY.XX.—NEW SPECIES OF LABOULBENIACEÆ FROM  
VARIOUS LOCALITIES.

BY ROLAND THAXTER.

Presented May 10, 1893.

THE present paper, which is the fourth preliminary contribution towards an illustrated monograph of the Laboulbeniaceæ now in preparation, is based upon material collected during the past year in Maine and Massachusetts, or derived from the collections of Coleoptera in the Museum of Comparative Zoölogy in Cambridge, for the privilege of examining which, as well as for numerous determinations of hosts, the writer is greatly indebted to Mr. Samuel Henshaw.

The additions to the family herewith presented serve nearly to double the number of forms previously known, and from the astonishing modifications which many of them exhibit form a very important contribution towards a knowledge of what must inevitably prove a large and varied group. Apart from mere singularity of form, however, the most interesting phenomenon which they illustrate is perhaps that connected with the not unexpected separation of the sexes upon distinct individuals, which occurs in two of the new genera described.

In the present as well as in the three previous papers above mentioned, the writer has purposely avoided any discussion of the many interesting questions connected with the general morphology of the group and the special development and relationships of the various forms described, since these matters, which will find their proper place in the monograph above referred to, could not well be considered in a series of purely descriptive papers. It has seemed, however, best in the following descriptions, to recognize the sexual character of the appendages peculiar to the group by discarding the term "pseudoparaphysis," hitherto used to designate them, and substituting

in its place the term "antheridial appendage," in recognition of their true character. In other respects the terms here used correspond with those previously employed, except that it has been found convenient to designate the blackened cell from which the appendages arise in typical species of *Laboulbenia* as the "insertion cell."

Of the fifty-two new species described, twenty are referred to the genus *Laboulbenia*, five each to *Acanthomyces* and *Ceratomyces*, two each to *Heimatomyces* and *Corethromyces*, and one each to *Cantharomyces* and *Peyritsiella*; while the remaining forms are included under new genera as follows: *Haplomyces*, having three species; *Rhadinomyces* and *Amorphomyces*, each with two species; *Dichomyces*, *Chaetomyces*, *Idiomyces*, and *Dimorphomyces*, each including a single species.

#### DIMORPHOMYCES, nov. gen.

Sexual organs borne on separate individuals.

Male individual consisting of a series of several superposed cells, the sub-basal one bearing the large cellular long-necked antheridium.

Female individual consisting of several superposed cells, from the basal of which arise one to several perithecia and simple sterile appendages. Perithecia asymmetrical; spores indistinctly septate.

This and the succeeding genus appear certainly to present instances of genera characterized by an invariable separation of the sexes on distinct and peculiar individuals. In the present genus the antheridium, though resembling that of *Amorphomyces* in general shape and in the presence of a long neck for discharging the nearly spherical spermatia, is far more highly developed, being proportionately much larger and distinctly cellular near the base. The asci are produced basally from an indistinct ascogenic cell, and the usual septum is scarcely visible in the mature spores.

#### DIMORPHOMYCES DENTICULATUS, nov. sp.

Male individual. Receptacle consisting typically of five superposed cells, tapering and more or less suffused with brown distally, the terminal cell (when uninjured) ending in a nearly spherical blackish tip. Antheridium arising from the large sub-basal cell of the receptacle, its base inflated inwardly, composed of several cells surrounding a central canal connecting with the long brownish slightly curved neck. Total length to tip of receptacle  $40\ \mu$ ; to tip of antheridium  $50-55\ \mu$ . Greatest width  $14\ \mu$ .

Female individual. Receptacle consisting of three superposed cells, short, the distal cell cylindrical and symmetrically rounded at

the apex. From the basal cell which becomes broad, lobulated, and indistinctly vertically septate, arise directly one to four perithecia and one to four sterile usually simple appendages, the latter tapering slightly, distinctly septate, hardly exceeding the mature perithecia in length. Perithecia slender, the base prolonged into a short slender stalk separated from the basal cell of the receptacle by a septum between which and the ascogenic cell no septa are visible: the apex broad, apiculate, sharply bent towards a tooth-like projection which arises just below it. Spores  $33 \times 3.5 \mu$ . Perithecia  $65-70 \times 15 \mu$ . Appendages about  $110 \mu$ . Receptacle about  $40 \mu$  long.

On abdomen of *Falagria dissecta* Er., Massachusetts.

#### AMORPHOMYCES, nov. gen.

Sexual organs borne on separate individuals.

Male individual. Receptacle consisting of two superposed cells bearing terminally a single one-celled long necked antheridium.

Female individual. Receptacle consisting of a few superposed cells, without true appendages, bearing terminally a single large perithecium. Asci arising from a lateral placenta-like ascogenic area.

The single antheridium seems constant in the species in which the male individual is known, but it is not improbable that further knowledge of the genus may necessitate a modification of the above diagnosis in this respect, since, as shown by other genera, the number of antheridia present is usually variable.

A third form, apparently referable to this genus, was observed on a species of *Lathrobium*, and is marked by a greater development of the lateral prominence from the receptacle present in *A. floridanus*.

#### AMORPHOMYCES FALAGRIÆ, nov. sp.

Male individual consisting of three superposed cells, the basal and sub-basal about equal, the latter suffused with dark brown; the distal cell an antheridium basally slightly inflated, distally prolonged into a cylindrical neck bent to one side. Total length  $48 \mu$  by  $10 \mu$  broad.

Female individual. Receptacle hyaline, consisting of a small basal cell, sometimes partly divided, surmounted by a few (three or four) small cells more or less irregular in shape, number, and position, from which arises the large pale brownish yellow perithecium, which is curved strongly on the side opposite the ascigerous area, and tapers to a blunt almost truncate tip furnished with rather prominent lips. Spores subcylindrical, about  $37 \times 6 \mu$ . Perithecia  $100 \times 30-33 \mu$ . Total length  $130-138 \mu$ .

On abdomen of *Falagria dissecta* Er., Massachusetts.

## AMORPHOMYCES FLORIDANUS, nov. sp.

Male unknown.

Female. Receptacle consisting of a basal cell, partly divided, from which arises on one side (corresponding to the ascigerous side of the perithecium) a somewhat indurated projection which extends upwards nearly to the base of the perithecium. Perithecium externally rounded and tapering considerably to the blunt apex, the basal cells, one of which is as large as the rest of the receptacle, forming a short stalk. Spores about  $30 \times 5 \mu$ . Perithecium  $150 \times 52 \mu$ . Receptacle (including stalk cells of perithecium)  $62 \mu$  long.

On the abdomen of *Bledius basalis* Lec., Florida.

## HAPLOMYCES, nov. gen.

Receptacle consisting of two small superposed cells from which arise the single perithecium and the single antheridial appendage. Perithecium large, pointed, borne on a single stalk cell surmounted by two basal cells. Antheridial appendage consisting of a basal cell surmounted by a terminal body, the antheridium, divided by anastomosing septa into numerous small cells and furnished with a short lateral projection, together with a subterminal short spine-like process arising from a rounded base. Asci four-spored, arising from four main ascogonic centres, each of which is divided into two secondary centres.

A very simple type, without sterile appendages, nearly allied to *Cantharomyces* by the presence of a highly developed cellular antheridium, which in the latter genus is lateral in position and without the characteristic thorn-like tip. The three species described adhere strictly to the generic characters given, and appear to be abundantly distinct.

## HAPLOMYCES CALIFORNICUS, nov. sp.

Perithecium faintly olive-brown, inflated at the base; the distal portion curved strongly inwards, the stalk cell hyaline, broad, subtriangular; the basal cells short and broad, the inner larger, its pointed apex extending upwards beyond the ascogonic centre, both more or less suffused with olive-brown. Receptacle small, the basal cell slightly suffused, the distal cell black and opaque, the opacity including the whole of the basal cell of the appendage. Antheridium twice as long as broad, tinged with brown. Thorn-like apiculus prominent, its base well marked. Spores  $37-40 \times 3 \mu$ . Perithecia  $130-145 \times 65 \mu$ . Stalk cell of perithecium  $45-50 \times 38 \mu$ . Anthe-

ridium  $33 \times 19 \mu$ . Receptacle  $45-55 \times 15-18 \mu$ . Total length to tip of perithecium  $240-260 \mu$ . Total length of antheridial appendage  $48-55 \mu$ .

On abdomen of *Bledius ornatus* Lec., California.

#### HAPLOMYCES TEXANUS, nov. sp.

Perithecia almost symmetrically conical, straw-yellow, the tip rather blunt; the stalk cell nearly hyaline, twice as long as broad, slender at the base; the basal cells elongate, nearly equal; distally almost truncate. Receptacle small, the basal cell nearly hyaline; the distal cell very small, slightly broader than long, blackened and opaque, the opacity including the lower outer portion of the basal cell of the appendage, the unblackened portion of which, together with the antheridium, becomes suffused with brown. Spores  $40-45 \times 3.7 \mu$ . Perithecia  $165-185 \times 50-55 \mu$ . Stalk cell of perithecium  $65-90 \times 26-33 \mu$ . Antheridium  $32 \times 18 \mu$ . Receptacle  $37-45 \times 18 \mu$ . Total length to tip of perithecium  $315-370 \mu$ . Total length of antheridial appendage  $35-40 \mu$ .

On abdomen and elytra of *Bledius rubiginosus* Er., Texas.

Distinguished from the preceding species by its pale yellowish color, conical nearly straight perithecium, and by the elongated basal cells of the latter. What appears to be the young condition of the same species occurred with it, differing in the absence of any blackening of the receptacle or appendage.

#### HAPLOMYCES VIRGINIANUS, nov. sp.

Perithecium short, stout, straw-yellow, outwardly inflated, the outer margin curved strongly inwards to the conical distal portion, the apex bluntly pointed; stalk cell long, nearly cylindrical, distally expanded slightly, the basal cells of perithecium very small, almost obsolete. Basal cell of receptacle large, the distal cell very small, and several times as broad as long, the stalk cell of the perithecium arising from it, but also connected with the distal portion of the basal cell. Basal cell of antheridial appendage squarish, slightly broader than long, the antheridium rounded, its reticulations coarse, the thorn-like apiculus very fine (about  $5 \mu$  long) and abruptly distinguished from its flattened base. Spores  $33 \times 3.7-5.5 \mu$ . Perithecia  $110-130 \times 55-60 \mu$ . Stalk cell of perithecium  $75-110 \times 19-25 \mu$ . Antheridium  $18 \mu$  long,  $22-23 \mu$  wide. Receptacle, basal cell  $45-50 \times 18-19 \mu$ , distal cell about  $18.5 \times 6 \mu$ . Total length to tip of perithecium  $220-275 \mu$ . Total length of appendage  $30-33 \mu$ .

On abdomen of *Bledius emarginatus* Say, Virginia.

Distinguished from the remaining species by the great reduction of the basal cells of the perithecium and the distal cell of the receptacle, as well as by the shorter more rounded antheridium.

A further knowledge of the members of the genus previously described under the name of *Cantharomyces* makes it possible to define its characters more exactly than was at first practicable, and the original diagnosis may be modified as follows.

#### CANTHAROMYCES, THAXTER, emend.

Receptacle consisting of two superposed cells, the distal producing one or more stalked perithecia, and one or more antheridial appendages. Perithecia subconical, borne on a single stalk cell surmounted by two basal cells. Antheridial appendages consisting of two superposed cells, terminated by one or two cells which may bear several branches, the sub-basal cell divided into two parts longitudinally or obliquely, one of which (the antheridium) is subdivided by anastomosing septa into numerous small cells.

*C. Bledii* is taken as the type of this genus and the species defined below, together with a third as yet undescribed, correspond strictly to the diagnosis given. *Cantharomyces verticillatus* of a former paper departs distinctly from this type, and should be generically separated; but owing to the scantiness of the available material of this form a description is deferred for the present.

#### CANTHAROMYCES OCCIDENTALIS, nov. sp.

More or less suffused with brown. Perithecium rather short, subconical, slightly inflated towards the base; the distal portion very slightly curved outwards, the apex bluntly pointed: stalk cell large cylindrical not exceeding the antheridium; basal cells each several times as long as broad. Basal cell of receptacle very small, the sub-basal cell much larger, inflated without blackening or externally and inferiorly deeply blackened and slightly incurved. Basal cell of the appendage similar to the distal cell of the receptacle, larger and unmodified or similarly blackened: the sub-basal cell large, its upper inner quarter, only, modified by anastomosing septa to form the antheridium, which bulges slightly on the inner side and is more or less pointed inferiorly: the appendage terminated by several superposed cells. Perithecium  $96-100 \times 60 \mu$ . Stalk cell of perithecium

120–140  $\times$  26  $\mu$ . Length of appendage to tip of antheridium 110–150  $\mu$ . Total length to tip of perithecium 280–335  $\mu$ .

On abdomen of *Bledius armatus* Er., Utah.

Distinguished from *C. Bledii* by its brown color, the greater elongation of the basal cells of the perithecium, and the relatively small antheridium, which in *C. Bledii* is external and comprises about five sixths of the sub-basal cell. The two specimens examined have each a single perithecium, and but one appendage, the tip of which is somewhat broken. A number of young specimens apparently belonging to this species, and occurring on *B. jacobinus* Lec., have the terminal portion of the appendage unbranched and consisting of a short series of superposed cells.

#### IDIOMYCES, nov. gen.

Receptacle short; flattened, terminated on one side by a series of superposed cells bearing externally a vertical row of closely set appendages, on the opposite side by one or more stalked perithecia at the base of which on one side arises a second transverse series of similar appendages. Perithecia straight, symmetrical, borne on a stalk composed of a single basal and several terminal cells. Appendages consisting of a series of antheridial cells, their projecting necks forming a comb-like appendage which may be terminated by short branches. Spores as in other genera.

The appendages of this curious genus recall those of *Stigmatomyces*, which is perhaps its nearest ally. The arrangement of these appendages in two series, one upon a differentiated and the other upon an undifferentiated base, is remarkable and peculiar to this genus which is very probably identical with that referred to by Peyritsch\* as occurring on *Deleaster* in Austria.

#### IDIOMYCES PEYRITSCHII, nov. sp.

More or less tinged with yellowish or reddish brown. Receptacle consisting of two superposed basal cells, surmounted by two cells; the outer, having a very thick external wall which forms a distinct prominence distally, is succeeded by a row of about five or six superposed, more or less flattened cells, extending beyond the base of the perithecium, which bear externally a vertical series of closely set appendages: the inner is succeeded by a single rounded cell followed by several small cells which give rise to a transverse series of about six appen-

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\* Sitz. d. Wien. Akad., 1875, LXXII. Abth. 3.



dages. Appendages mostly fertile, borne on one or two squarish basal cells, terminated by a simple or once branched short filament. Perithecia short, thick, subconical, the apex subtruncate, the base slightly inflated, borne on a long stalk made up of a single basal and two sub-basal cells, the outer directly in contact with the perithecium, the inner separated from it by two small cells. Spores  $60 \times 4 \mu$ . Perithecia  $110-130 \times 60-70 \mu$ . Appendages, longer,  $80 \mu$ . Receptacle  $130-165 \times 70-95 \mu$ . Stalk of perithecium, longest,  $200 \mu$ .

On abdomen of *Deleaster dichrous* Grav., Germany.

LABOULBENIA UMBONATA, nov. sp.

Perithecium becoming faintly suffused with brown, projecting free from the receptacle at an angle of about  $60^\circ$ , the outer margin curved inwards strongly to the blackish tip, the prominent ear-like lips of which are strongly incurved; a clearly defined rounded prominence on the inner side below the apex. Outer appendage hyaline, or with faint brown shades, consisting of a large stout cylindrical basal portion nearly equalling the receptacle in diameter and length, made up of a basal and somewhat shorter sub-basal cell from the distal end of which arise two (rarely three) straight, very long and slender tapering branches. Inner appendage arising from a very small triangular basal cell, its external wall directly continued by that of the outer appendage by which its upper surface is covered, its lower half cutting off obliquely a small portion of the large black insertion cell: its upper half producing sublaterally a single short appendage, consisting of a single cell bearing at its apex two rather long antheridia. Receptacle characterized by a stalk-like slightly inflated base, made up of cells (1) and (2), which are very large, the cells of the distal portion except cells (4) and (5) very greatly reduced, so that the perithecium appears to arise almost directly from cell (2). Cells (4) and (5) elongated, the upper half of cell (5) free from the perithecium; the axis of the receptacle coincident with that of the outer appendage. Spores  $60 \times 5 \mu$ . Perithecia  $110 \times 59 \mu$  (including the hump which projects about  $7 \mu$ ). Appendages (longest)  $925 \mu$ . Receptacle  $155-185 \times 18-33 \mu$ .

On right side of thorax of *Stenolophus ochropeus* Say, Maine.

LABOULBENIA SUBTERRANEA, nov. sp.

More or less suffused with brown, or with the two basal cells quite hyaline. Perithecia long, slightly inflated at the base, tapering more or less evenly to the subcylindrical apex, the lips of which are turned

slightly outwards. Appendages arising from two basal cells, the outer very large almost covering the very small inner one and continued directly to form the usually very large long simple outer appendage, which is septate, slightly constricted at the septa with a marked general constriction usually present towards the base, accompanied by a brown suffusion. The inner basal cell gives rise to a single short branch bearing one or two antheridea. The black insertion cell eventually thrust obliquely outwards by cell (5) free from the perithecium. Receptacle sometimes short, more often very long through the elongation of cell (2), the distal portion reduced, usually blackish brown, while the two basal cells are hyaline. Perithecia  $135-160 \times 50 \mu$ . Outer appendage, longest  $1065 \mu$ ; average  $725 \mu$ . Total length to tip of perithecium  $220-480 \mu$ ; average  $375 \mu$ .

On *Anophthalmus Menetriesii* Motsch., and *A. angustatus* Lec., in limestone caves, Kentucky. On *A. Motschulskyi* Schm., Carniola.

A peculiar and variable species. Forms occurring on the jaws of the host (a blind cave beetle) are short and compact, while others, especially those occurring on the lower surface of the abdomen, are very elongate. The European specimens are small and rather slender, but can hardly be separated from the American form. A second species of *Laboulbenia* allied to *L. luxurians* occurs on *Anophthalmi* from caves in Illinois, but the material is hardly sufficient to warrant its description.

#### LABOULBENIA CATOSCOPI, nov. sp.

Pale brownish yellow becoming suffused with olive-brown at the base of the perithecium and in the region of cell (3). Perithecium moderate, the apex rather prominent, blackened except about the pore, the blackening continued downwards externally to the body of the perithecium. Outer appendage single simple nearly straight, exceeding the perithecium; its basal cell very large, outwardly inflated and blackened. Inner appendage consisting of a much smaller basal cell, from which arise directly from two to six branches which may be once or twice successively branched; the antheridia solitary. Receptacle rather elongate, normal, cell (4) projecting outwards beyond the rather thick black insertion cell, which is situated between the two lower thirds of the perithecium. Spores  $65 \times 5 \mu$ . Perithecia  $100-130 \times 37 \mu$ . Appendages (longest observed)  $110-130 \mu$ . Total length to tip of perithecia  $250-320 \mu$ .

On the abdomen of *Catoscopus guatemalensis* Bates, Mexico.

Belonging to the *flagellata* group, in which it is at once distin-

guished by the inflated basal cell of the outer appendage. More abundant material may show that the measurements of the appendages given are too small.

LABOULBENIA FILIFERA, nov. sp.

Perithecium tinged with olive-brown, the apex deeply blackened, broad, more or less evenly rounded, often symmetrical. Appendages consisting of two basal cells, the inner minute, the outer large, usually followed by a sub-basal cell from which arise two very elongate simple erect branches, at first dark brown above their nearly hyaline basal cells. The inner appendage consists of one or two short hyaline fertile branches, one of which may be long and sterile. The insertion cell placed between the two lower thirds of the perithecium. Receptacle short, about equalling the perithecium in length, the inner margins abruptly divergent above cell (2). Spores about  $50 \times 4 \mu$ . Perithecia, average  $25 \times 90 \mu$ . Appendages, longest  $550 \mu$ . Total length to tip of perithecium  $150-190 \mu$ .

On elytra of *Anisodactylus Harrisii* Lec., *A. nigerimus* Dej., and *A. interpunctatus* Kirby, Maine, Massachusetts, Pennsylvania.

LABOULBENIA COMPRESSA, nov. sp.

Pale yellowish. Perithecia becoming tinged with olive-brown, the lips compressed to form an evenly rounded apex, which is commonly bent slightly outwards and blackish brown except about the pore, which is external and lateral. Appendages consisting of two basal cells, the outer much the largest, bearing a single appendage usually once branched, the lower cells slightly inflated, the ultimate branches straight and tapering. From the inner basal cell arise several branches, some short and fertile, others resembling the longer outer appendage. Insertion cell placed just below the middle of the perithecium. Receptacle normal, the basal cell usually curved. Spores  $50 \times 3.7-4 \mu$ . Perithecia  $85-100 \times 30 \mu$ . Appendages, longest  $150-200 \mu$ . Total length to tip of perithecium  $175-260 \mu$ , average  $210 \mu$ .

On elytra and at base of middle pair of legs of *Anisodactylus baltimorensis* Say, Maine.

Easily separable from other forms by its peculiarly pointed perithecium.

LABOULBENIA POLYPHAGA, nov. sp.

Perithecium slender, the outer edge nearly straight, with a more or less well marked prominence below the apex; the tip prominent,

rather narrow, bent outwards, deep black, hyaline about the pore, with brown shades more or less well marked below the tip and about the lower half. Appendages two, the outer consisting of a large basal cell, which may be continued directly to form a long simple straight appendage distinctly constricted at the joints, or may bear two similar branches. The inner basal cell bears one or two short branches, from which arise small clusters of brownish antheridia, and rarely a more elongate sterile branch. Receptacle rather slender, a more or less well marked brown suffusion usually present in the distal portion. Spores  $45 \times 4 \mu$ . Perithecia, average  $85 \times 30 \mu$ . Appendages, longest  $300 \mu$ . Total length to tip of perithecium, average  $200-220 \mu$ .

On elytra of *Olisthopus parmatus* Say, Maine; *Stenolophus limbalis* Lec., Washington; *Badister maculatus* Lec., Texas; *Harpalus pleuriticus* Kirby, Massachusetts. A carabid near *Stenolophus*, Brazil.

This form, although presenting no striking peculiarities of structure, seems sufficiently well defined to warrant its separation as a distinct species. It is nearly allied to *L. Pterostichi*, but differs in its small size and more simple appendages. A form apparently identical with it occurs on several species of *Loxandrus* from Florida and Texas. The specimens on *Badister* are more or less evenly suffused with brownish yellow, due perhaps to age and alcohol.

LABOULBENIA PTEROSTICHI, nov. sp.

Becoming more or less, often deeply, suffused with olive-brown. Perithecium becoming deeply suffused, the outer margin commonly straight, the apex rather coarse-lipped. Outer appendage consisting of a large basal cell, above which it is usually three times successively dichotomously branched, the ultimate branches long, straight, the outer ones especially tinged with reddish brown. Inner appendage consisting of a small basal cell giving rise to from one to three short branches bearing one to several fertile branchlets, sometimes also to one or more long sterile branches. Receptacle normal, usually elongate. Spores  $75-80 \times 6.5 \mu$ . Perithecium  $130-160 \times 48-55 \mu$ . Appendages (longest)  $725 \mu$ , average  $400-500 \mu$ .

On *Pterostichus adoxus* Say, and *P. luctuosus* Dej., Maine; *P. manicus*, Southern States.

A form closely allied to *L. elongata*, from which some of its varieties can hardly be distinguished. The usual absence of sterile branches in the inner appendage and the character and branching of the outer

appendage serve to distinguish it. It is nearly allied also to the smaller *L. polyphaga*.

LABOULBENIA EUROPEA, nov. sp.

Amber-brown. Perithecium darker amber-colored, rather narrow, its tip nearly straight, broad, black except the edges of the coarse lips, which are turned slightly outwards, an olive shade extending below the blackened portion. Outer appendage hyaline, suffused below with olive-brown deeply colored externally near the base, simple or more commonly consisting of a basal and a sub-basal cell which bears two long slender tapering branches: more rarely the basal cell bears two branches directly, the inner simple, the outer bearing two branches from its basal cell. Inner appendage consisting of a basal cell which may bear two branches directly, or more commonly is followed by a sub-basal cell bearing a long simple sterile branch and a shorter fertile branch producing several antheridia and one or two sterile divisions which sometimes become elongate. Receptacle normal, a very slight olive suffusion of the external surface of cell 4. Spores  $55-59 \times 4-4.5 \mu$ . Perithecia  $130-140 \times 55 \mu$ . Appendages (longest)  $250 \mu$ . Total length to tip of perithecium  $250-300 \mu$ .

On *Chlænius æneocephalus* Dej., *C. chrysocephalus* Rossi, *Callistus lunatus* Fabr., *Aptinus mutilatus* Fabr., Europe.

Allied to *L. Pterostichi*, from which it is readily separated by its amber color, its sparingly branched appendages, and by the shape of its perithecium.

LABOULBENIA QUEDII, nov. sp.

Perithecium moderate, straight, slightly suffused with brownish, darker externally just below the apex, the lips turned outwards, the outer hyaline, the inner blackened. Outer appendage consisting of a rather large basal cell bearing two branches, the outer strongly curved outwards, usually bearing two secondary branches from its basal cell suffused with blackish; the inner also similarly branched, the branches long, tapering to a blunt point, often suffused with brown near the base. The inner appendages commonly arise from two basal cells, the inmost smaller and lower in position, each giving rise to a variable number of appendages, usually not more than once branched, hyaline except the outer one which is larger and usually suffused with brown near its base. Receptacle elongate. Spores about  $55 \mu$  long. Perithecium  $185 \times 50 \mu$ . Longest appendages  $370 \mu$ . Total length to tip of perithecium  $630 \mu$ .

On the upper surface of abdomen of *Quedius vernilis* Lec., Illinois.

The insertion cell of the appendages in this species is broad and remains hyaline until the plant is nearly mature, when it is not very deeply blackened.

LABOULBENIA PROLIFERANS, nov. sp.

Reddish brown more or less tinged with olive. Perithecia tinged with olive, darker below the hyaline lips, normal in form. Appendages consisting of two closely united basal cells nearly equal, seated on a thick black insertion cell, and bearing usually two simple branches, the outer longer. The appendages with their insertion cell are pushed outwards from the perithecium by the enlargement and division of cell (5), from the upper part of which one or two small cells may be cut off by oblique partitions, each becoming proliferous and producing a simple appendage similar to and equalling the normal appendages. Receptacle elongate, normal except for the proliferation of cell (5). Spores  $60-70 \times 5.5 \mu$ . Perithecia  $165-170 \times 55 \mu$ . Longest appendages  $460 \mu$ . Total length to tip of perithecium  $435-540 \mu$ .

On elytra of *Eudema tropicum* Hope, Sierra Leone; "*Chlænium auricollis* Gory, Syria"; *Dolichus* sp.?, Japan.

A large species at once distinguished by the proliferation of cell (5). The material from Syria and Japan, though in poor condition, is identical with that from Africa.

LABOULBENIA COPTODERÆ, nov. sp.

More or less suffused with faintly olive brown. Perithecium rather large, the apex, which is bent slightly outwards, dark, the lateral lips forming a slight angular prominence over the lateral external pore. Appendages two, the outer single, curved outwards, blackened externally or wholly opaque, giving rise from its convex side to several successive branches rather irregular in outline and often once branched above their basal cells. Inner appendage consisting of a larger basal cell which gives rise from its apex on either side to a branch, these two branches in turn successively several times branched, but in a plane at right angles to their own; the lower cells more or less deeply suffused or externally blackened. Receptacle normal, cell (2) of large diameter. Spores  $40 \times 3.5 \mu$ . Perithecia  $100-110 \times 33-35 \mu$ . Appendages (longest)  $150 \mu$ . Total length to tip of perithecium (average)  $200 \mu$ .

On *Coptodera Championi* Bates, Panama, growing along the outer margin of the elytra.

## LABOULBENIA MORIONIS, nov. sp.

Pale straw-colored throughout except for a slight blackish brown shade below the apex of the perithecium. Perithecium small, narrow, its whole inner margin connected with the receptacle, beyond which the rather truncate hyaline tip barely projects. Appendages inconspicuous, consisting of two basal cells each of which may bear one to three short branches. Receptacle elongate, somewhat wedge-shaped, the small blackened insertion cell carried outwards with the appendages free from the perithecium. Spores  $55 \times 5 \mu$ . Appendages  $40-50 \mu$ . Perithecia  $110-125 \times 30 \mu$ . Total length to tip of perithecium  $375-425 \mu$ . Greatest width including perithecium  $50 \mu$ .

On the elytra of *Morio georgiæ* Pal., Mexico.

A singular species allied to the last, its small perithecium scarcely distinguishable, at first sight, from the body of the receptacle. The appendages are almost obsolete in some specimens.

## LABOULBENIA CLIVINÆ, nov. sp.

Hyaline or tinged with straw-yellow. Perithecium rather broad, its tip only free from the receptacle, short, the inner margin curved abruptly outwards from the receptacle to the blunt apex, the lips of which are turned outwards, the upper hyaline with a slight brown suffusion. Appendage usually *single* arising from cell (4) or from cells (4) and (5) directly without any blackened insertion cell: consisting of a basal cell simple or longitudinally divided, above which it may be successively several times branched. A second appendage is rarely present, arising apparently from the upper division of cell (5). Receptacle hyaline, elongate, normal, except for cells (4) and (5), which become more or less irregularly divided into from four to eight smaller cells. Spores  $75 \times 5 \mu$ . Perithecia  $145-150 \times 55-60 \mu$ . Appendage  $110-150 \mu$ . Total length to tip of perithecium (maximum)  $400 \mu$ .

On the elytra, thorax, and legs of *Clivina dentifemorata* Putz., Mexico.

This species is remarkable for possessing usually but a single appendage, and from the absence of any blackened insertion cell, which may, however, be represented by the upper apparent divisions of cells (4) and (5). The species is allied to, though abundantly distinct from, *L. Schizogenii*, which occurs on a closely related host.

*LABOULBENIA PHEROPSOPHI*, nov. sp.

Perithecium becoming suffused with blackish brown, straight, the two upper thirds free from the receptacle, rather slender, the outer margin curving abruptly inwards to the base of the prominent tip, which is itself bent slightly outwards, its base deeply suffused. Outer appendage slightly divergent, somewhat exceeding the perithecium, composed of usually five or six superposed cells somewhat longer than broad, each of which gives rise externally from its upper half to a single simple short branch, tapering distally, slightly constricted near the base where it is divided by a blackened septum: insertion cell rather broad, black, and considerably exceeded externally by the free upper surface of cell (4). Inner appendage smaller and similar or once to twice subdichotomously branched above its basal cell, the lower septa blackened. Receptacle normal cell (2) usually hyaline, the rest becoming suffused with olive-brown. Spores  $75 \times 4.5 \mu$ . Perithecia  $150 \times 50 \mu$ . External appendage  $100-150 \mu$ , its branches about  $50 \mu$  long. Total length to tip of perithecium  $250-500 \mu$ .

On *Pheropsophus æquinotialis* Linn. and several undetermined species from South America. On *P. marginatus* Dej. var.? from Zanzibar.

*LABOULBENIA PANAGÆI*, nov. sp.

Perithecia becoming wholly suffused with blackish brown, straight, thick-walled, cylindrical or slightly inflated, the apex truncate or slightly oblique outwards, the outer lip nearly hyaline. Appendages arising opposite the base of the perithecium, consisting of two equally broad basal cells, the inner shorter, bearing each a single cell from which arise from three to five usually simple branches hardly exceeding the perithecium, the lower cells usually inflated, the septa blackened, as is the outer wall of the external basal cell. Receptacle normal, cells (3) and (4) blackened externally or wholly, the suffusion becoming general in older individuals in which the basal cells of the perithecium may become elongated to form a neck-like base free from the insertion cell of the appendages which becomes pushed out quite free from the perithecium by the elongation of cells (4) and (5). Perithecia  $100-150 \times 35-40 \mu$ . Longer appendages  $250-330 \mu$ . Total length to tip of perithecium  $240-330 \mu$ .

On elytra and thorax of *Panagæus crucigerus* Say, and *P. fasciatus* Say, Southern United States.

Specimens occurring upon *P. crucigerus* are decidedly larger than



those observed upon the smaller species. The form belongs to the group of which *L. Galeritæ* may be taken as the type, in which the base of the cylindrical thick-walled perithecium tends to become elongated to form a neck-like insertion. The host affected is one of the myrmecophilous *Carabidæ* inhabiting ants' nests.

*LABOULBBINA AUSTRALIENSIS*, nov. sp.

Perithecia as in the preceding species, less deeply suffused and supported in older individuals by a more or less neck-like base. Appendages consisting of two closely united basal cells; the outer much the largest, and giving rise directly to two branches, the outer deeply suffused with olive-brown, the inner once or twice branched, hyaline or with suffused tips. The inner basal cell gives rise to one or two branches, simple or once or twice branched: the insertion cell black, thick and rather narrow, placed opposite the base of the perithecium. Receptacle normal, except for the eventually neck-like hyaline base of the perithecium, hyaline becoming suffused with olive-brown, especially in the region of cells (2), (3), and (6). Spores  $74 \times 5.5 \mu$ . Perithecia  $110-148 \times 38 \mu$ . Longest appendages  $222 \mu$ . Total length to tip of perithecium  $220-300 \mu$ .

On elytra of *Acrogenys hirsuta* McLeay, Australia.

Closely allied to *L. Panagæi*, from which it is distinguished by its appendages, which are longer, the outer branch blackened and the basal joints not inflated.

*LABOULBENIA MEXICANA*, nov. sp.

Pale amber-colored, the basal cell and mature perithecium more deeply suffused. Perithecia large, straight, thick-walled, the black hyaline-lipped apex abruptly distinguished, nearly symmetrical. Appendages hardly exceeding the perithecium, consisting of two basal cells, the outer giving rise to two branches, an outer usually simple, more deeply suffused, and an inner larger, once or twice branched. From the inner basal cell arise two branches on either side, once or twice successively branched, and bearing a few single antheridia laterally. Receptacle elongate, often abnormally septate, the basal cells of the perithecium extending upwards about the ascogenous area and forming a broad more than usually elongate base. Spores  $90-100 \times 7 \mu$ . Perithecia  $200-240 \times 65 \mu$ . Appendages, longest,  $220 \mu$ . Total length to tip of perithecium  $500-600 \mu$ .

On elytra of *Galerita mexicana* Chaud., *G. nigra* Chev., *G. æquinoctialis* Chaud., Mexico and Nicaragua.

A few specimens suggesting a hybrid between this species and the nearly allied *L. Galeritæ*, which occurs in company with it, were found on a specimen of *G. mexicana* from Nicaragua associated with the normal form. In the variety the appendages and receptacle are those of *L. mexicana*, while the perithecium with its slender neck-like base, although not punctate, is that of *L. Galeritæ*.

LABOULBENIA LONGICOLLIS, nov. sp.

Perithecia becoming suffused with dark brown, straight, thick-walled, often slightly inflated, the apex short, rather large, abruptly distinguished, black, its lips hyaline turned slightly inwards. Appendages consisting of two basal cells, the inner smaller, bearing distally two rounded cells, the upper surface of each blackened and bearing two to five branches which arise side by side and spreading laterally may be successively and similarly twice branched, the whole having a fan-like habit, the ultimate branches usually one to three in number, either bearing two to three long-necked antheridia, or sterile, somewhat elongate, straight and tapering. The outer basal cell superiorly and externally blackened, the blackened ridge extending obliquely outwards and downwards nearly to the base, bearing a row of closely set branches of variable number (three to five) which are successively three to five times dichotomously branched, the ultimate branches suffused with brown, straight, slender, tapering; the basal cells of all the main branches hyaline, slightly inflated inwardly, the septa black, contrasting. Receptacle large, cell (5) as large or nearly as large as cell (4), the basal cells of the perithecium about  $175\ \mu$  in length. Spores  $75 \times 6.5\ \mu$ . Perithecium  $180\text{--}220 \times 50\text{--}60\ \mu$ . Longest appendages  $510\ \mu$ . Total length to tip of perithecium  $500\text{--}780\ \mu$ .

On elytra of *Galerita leptodera* Chaud., Guinea.

A very large species, allied to *L. Galeritæ* and *L. mexicana*, from which it is distinguished by its complicated and highly developed appendages, and the remarkable elongation of the base of the perithecium.

LABOULBENIA TEXANA, nov. sp.

Perithecium wholly suffused with blackish brown, short, its upper half free, the outer edge abruptly curved inwards to the base of the very prominent apex, the lips of which are brown, slightly pointed. Appendages two, hyaline, almost distinct above the very broad black insertion cell, the outer broad at the base, tapering distally, strongly curved inwards, rather closely septate, a small cell opposite each sep-

tum on the convex side, bearing a single short simple branch rather closely septate, hyaline, blackened and constricted at the base, directed obliquely upwards. The inner appendage similar, except that a cell is present opposite the first septum at the base on the *inner* side, which bears a single atheridium or a very short fertile branch. Receptacle expanded above cell (2), cells (1) to (6) hyaline, the rest blackish brown: cell (5) greatly enlarged so as to throw the appendages outwards, separating them by nearly its whole width from the perithecium, its free upper surface forming a right angle with the straight inner margin of the perithecium; cells (1) and (2) rather slender. Perithecia  $130-150 \times 65 \mu$ . Appendages  $150-160 \mu$ , the branches (longer)  $75-100 \mu$ . Length to tip of perithecium  $400 \mu$ . Greatest width  $110 \mu$ .

On the thorax of *Brachinus* sp., Texas.

One of the most peculiar of all the species of *Laboulbenia*, the appendages of which are approached only by *L. Pheropsophi*.

#### LABOULBENIA PACHYTELIS, nov. sp.

Perithecium rather small, but slightly exceeding the receptacle, suffused with dark olive-brown, becoming nearly opaque, tapering abruptly to the rather slender blackened tip, which is bent slightly outwards, the nearly hyaline lips outwardly oblique. Appendages two; the outer forming a subconical body composed of superposed flattened cells four to ten in number, each cell giving rise externally to a single obliquely ascending, rather short, simple, stout, tapering branch, blackened at its base, where a basal cell is cut off by a contrasting black septum. The inner appendage consisting of a small basal and sub-basal cell separated by a blackened septum, the upper giving rise directly to from one to three antheridia or short sterile branches. Receptacle short or elongate, nearly hyaline or becoming distally suffused with blackish brown, normal, except for the unusual development of cell (5), which extends along the inner margin of the perithecium beyond the insertion of the appendages, pushing them outward free from the perithecium. Spores  $66 \times 7 \mu$ . Perithecia  $110-150 \times 50 \mu$ . Outer appendage, without branches,  $90 \mu$  long, the branches (longest)  $180 \mu$ . Total length to tip of perithecium  $300-650 \mu$ .

On legs and inferior surface of *Pachyteles mexicanus* Chaud., Mexico.

## LABOULBENIA CRISTATA, nov. sp.

More or less suffused with brown. Perithecium curved outwards, evenly often deeply suffused with brown, tapering to the neck-like apex, its prominent lips turned outwards, the base of the inner lip more deeply suffused. Appendages two, the outer consisting of a large squarish cell surmounted by a sub-basal cell which bears on its upper flattened surface a series of from three to six large straight simple septate dark brown branches set side by side in a single row running from within outwards, the inner very long, the outermost basally deeply blackened and contracted, curved strongly outwards, its hyaline distal portion commonly broken off. The inner basal cell very small, producing usually two short branches bearing groups of large long-necked antheridia. Trichogyne large, branched and septate, the ultimate branches straight and tapering. Receptacle short, stout, hyaline becoming tinged with yellowish brown. Cell (1) small, cell (2) very large, all very thick-walled. Spores  $50-55 \times 4-4.5 \mu$ . Perithecia  $110-130 \times 37-45 \mu$ . Appendages (outer not including two basal cells)  $90-480 \mu$ , basal cells  $35 \mu$ . Total length to tip of perithecium  $250-280 \mu$ .

On elytra, abdomen, and legs of *Pæderus littorarius* Grav. and *P. obliteratus* Lec., Maine; *Pæderus* sp.? Mexico and Nicaragua; *Pæderus ruficollis* Fabr., Austria.

A species not to be confused with any other, owing to the crest-like outer appendage, which, however, varies considerably in the number of its branches. This is perhaps the form referred to by Rouget as occurring on *Pæderus* in France, and confused by him with *L. Rougetii* Robin.

## LABOULBENIA PHILONTHI, nov. sp.

Perithecium rather narrow, subconical, slightly inflated at the base, blackened along the margin below the hyaline lips which are turned slightly outwards. Appendages consisting of two basal cells, including, between and below them, a small triangular cell: the outer appendage simple or rarely once branched, its sub-basal cell commonly inflated with blackened septa. The inner basal cell gives rise to numerous branches which are straight, simple, or once to twice branched, the branchlets straight divaricate, hyaline, tapering to a blunt tip hardly exceeding the perithecium, their basal cells often more or less inflated, brownish with blackened septa. Insertion cell opposite the base of the perithecium. Receptacle usually short. Spores 52

$\times 4 \mu$ . Perithecia  $160-165 \times 50-70 \mu$ . Longest appendages  $165 \mu$ . Total length to tip of perithecium  $400-450 \mu$ , longest  $590 \mu$ .

On *Philonthus cunctans* Horn, Maine; *P. micans* Grav. and *P. debilis* Grav., Massachusetts; *P. æqualis* Horn, Lake Superior; *P. californicus* Mann, California.

The specimens on *P. micans* from Sharon, Mass., found growing on the upper surface of the abdomen of the host, though exactly resembling the typical form in other respects, have the basal cell of the receptacle obliquely produced to form a rounded prominence which is externally deeply blackened and forms a hoof-like base. The species is not strikingly peculiar, its appendages recalling those of *L. inflata*. It approaches the *luxurians* type through the presence of a third cell between the basal cells of its appendages, and is not to be confused with either of the other species known to occur on Staphylinidæ.

#### LABOULBENIA ZANZIBARINA, nov. sp.

Olive-brown except for the nearly hyaline basal cell. Perithecia large, more deeply colored below the somewhat suffused lips, the apex prominent, straight, truncate, hardly oblique. Appendages consisting of two, sometimes three, basal cells (the inner sometimes the larger), longer than broad, bent with their convexity outwards, externally blackened, giving rise to from one to several branches from the outer surface of their upper portions; the basal cell of each branch is also curved with its convexity outwards, externally blackened, and gives rise in a similar fashion to several secondary branches, the basal cells of which show the same tendency to curvature and bear a series of several ultimate branchlets from their distal portions, exceeding the perithecium often by more than its length. Receptacle becoming nearly opaque, except for the very small hyaline basal cell, stout and short, cells (2) and (6) placed almost side by side. Spores about  $50 \mu$  long. Perithecia  $100-110 \times 3.7 \mu$ . Appendages (longest)  $200 \mu$ . Total length to tip of perithecium  $185-200 \mu$ .

On *Crepidogaster bimaculata* Boh., Zanzibar, occurring at the tips of the elytra and the adjacent upper surface of the abdomen.

#### LABOULBENIA MINIMA, nov. sp.

Punctate, suffused with olive-brown, becoming nearly opaque, except the hyaline basal cell. Perithecia becoming rounded in outline, short, the apex broad truncate, coarse-lipped, distinctly punctate and nearly opaque at maturity. Appendages arising from a rounded base of insertion, composed of several cells and not distinguished from

the receptacle, densely clustered, the lower segments nearly hyaline, oval or rounded, with black septa, the ultimate branches cylindrical, hyaline, strongly curved towards and beyond the perithecium. Receptacle very short and stout, the basal cell curved and hyaline. Spores  $40 \times 3.5 \mu$ . Perithecia  $80 \times 40-48 \mu$ . Appendages (longest)  $75 \mu$ . Total length to tip of perithecia  $145-150 \mu$ .

On elytra and legs of *Calleida pallidipennis* Chaud., Panama.

The smallest known species of the genus belonging to the *luxurians* type.

LABOULBENIA GUERINII, Robin.

A form occurring on *Gyretes compressus* Lec. and *G. sinuatus* Lec., from Illinois and Texas, seems identical with the species figured by Robin, though somewhat smaller.

LABOULBENIA ANCEPS, Peyr.

A form common on *Platynus extensicollis* and several other species of the genus seems referable to this species, and is not separable from specimens found on *Anchomenus* (*Platynus*) *albipes*, from Austria. It is subject to considerable variation, and is perhaps too near *L. elongata* and *L. Rougetii*.

ACANTHOMYCES, THAXTER.

Several additional species of this genus correspond strictly to the type previously described, except that additional material shows the occasional production of two perithecia usually accompanied by a corresponding elongation of the receptacle.

ACANTHOMYCES LONGISSIMUS, nov. sp.

Perithecium brown, darker at the blunt apex, slightly inflated, its two lower thirds almost completely surrounded by a series of appendages arising from its base. Receptacle very long and slender, slightly flexuous, its main axis consisting of about thirty superposed cells deeply suffused with blackish brown, lighter at the septa. Appendages very numerous, externally opaque, internally more or less hyaline, short, slender, straight, appressed; a few curved, projecting outwards on either side in successive pairs. Spores  $60 \times 4 \mu$ . Perithecium  $185 \times 55 \mu$ . Appendages about  $110 \mu$  long, those at the base of the perithecium about  $165 \mu$ . Receptacle slightly exceeding a millimeter in length by  $30 \mu$  broad.

On elytra of *Colpodes evanescens* Bates, Guatemala.

## ACANTHOMYCES HYPOGÆUS, nov. sp.

Perithecium nearly sessile, terminal, pale straw-colored, hardly inflated, continuing the sigmoid curve of the receptacle, its blunt apex exceeding the tips of the appendages by about half its length. Receptacle uniformly pale straw-colored, bent in a sigmoid curve, the base slender, the remaining portion stout, the main axis consisting of about eighteen superposed cells with very oblique septa. Appendages numerous, closely set, appressed, slightly curved inwards, deep brown, the tips paler. Perithecium  $145 \times 37 \mu$ . Appendages  $110-150 \mu$ . Receptacle  $340 \times 37 \mu$ .

On the elytra of *Anophthalmus Bilimeki* Sturm., Carniolia, Austria.

## ACANTHOMYCES FURCATUS, nov. sp.

Perithecium more or less suffused with brownish, straight, slightly inflated at the base, tapering gradually to the apex, borne on a stout stalk cell surmounted by several small basal cells. Receptacle more or less tinged with brownish, its main axis consisting of about twelve superposed cells, continued by a more slender prolongation beyond the base of the perithecium, this prolongation sometimes forming a second successive main axis terminated by a second perithecium and continued by a similar prolongation beyond the base of this second perithecium which arises on the side of the general axis nearly opposite to that which bears the first. Appendages dark brown, opaque, stout, rigid, nearly straight or slightly curved outwards, the longest not equalling the tip of the perithecium. Spores  $48 \times 4 \mu$ . Perithecia  $160-185 \times 48-55 \mu$ . Appendages (longest) about  $150 \mu$ . Total length to tip of receptacle about  $360 \mu$ . Main body of receptacle about  $220 \mu$  long. Total length when two perithecia present (longest)  $550-600 \mu$ .

On abdomen of *Othius fulvipennis* Fab., Germany.

## ACANTHOMYCES BREVIPES, nov. sp.

Perithecium suffused with reddish brown, subfusiform with a well developed stout stalk. Receptacle very short, the main axis consisting usually of five superposed cells, with a short prolongation beyond the base of the perithecium, normally of not more than three or four cells, the cells all pale yellowish or with brown suffusions, the septa in all cases usually hyaline. Appendages few in number, opaque or nearly so, scattered, some of them very long, curved, and greatly ex-

ceeding the tip of the receptacle. Spores  $55 \times 4 \mu$ . Perithecium  $150-165 \times 45-55 \mu$ . Receptacle, main body about  $75 \times 30 \mu$ , its prolongation about  $35-40 \mu$ . Stalk of perithecium about  $40 \times 30 \mu$ . Appendages (longest)  $375-500 \mu$ .

On abdomen of *Lathrobium fulvipenne* Grav., Germany.

A small species, distinguished by its short receptacle and elongate appendages. As in *A. furcatus*, the receptacle may continue to grow, producing in a similar fashion one or even two additional perithecia. This phenomenon, however, seems in both cases to be usually associated with non-fertilization of the trichogynes, or with accidental injury to the perithecia first formed.

#### ACANTHOMYCES LATHROBII, nov. sp.

Perithecium becoming slightly suffused with brown, its conical tip dark brown, contrasting; rather slender, slightly inflated towards the base, borne on a short stalk cell more or less concealed. Receptacle consisting usually of eight to ten superposed cells, forming the main axis and deeply suffused with blackish brown except at the nearly hyaline septa. Appendages large, curved, almost opaque, nearly equaling, often greatly exceeding the tip of the perithecium. Spores about  $50 \times 4 \mu$ . Perithecia  $100-130 \times 35-40 \mu$ . Appendages (longer)  $150-450 \mu$ . Receptacle (average)  $110 \mu$  long.

On abdomen of *Lathrobium longiusculum* Grav., New Hampshire and Lake Superior; *Lathrobium* sp., Pennsylvania.

The appendages of the specimens from New Hampshire are constantly far longer than those of the Lake Superior specimens, resembling *A. brevipes* in this respect. The two forms seem otherwise identical, and are distinguished from *A. brevipes* by the characteristically brown-tipped perithecium, longer receptacle, and more densely crowded appendages.

#### CHÆTOMYCES, nov. gen.

Receptacle slender, consisting of numerous superposed cells, from which arise successively the appendages and one or more perithecia in a unilateral series. Perithecium flattened, the symmetrical apex prominent, borne on two stalk cells surmounted by several basal cells. Fertile appendages arising from cells of the receptacle immediately below the perithecium; sterile appendages arising from its terminal cells. Spores as in other genera.



## CHÆTOMYCES PINOPHILI, nov. sp.

Perithecium suffused with purplish, more deeply at the base and along its inner half, long, slender; the inner margin nearly straight, the outer curving inward distally to the prominent somewhat angularly inflated tip; the stalk cells bent upward at the base, so that the axis of the perithecium is nearly parallel to that of the receptacle, the lower short and narrow, the upper becoming distally as broad as the perithecium, the basal cells of which are not distinguished from it and are similarly suffused with purplish. Receptacle bristle-like, composed of about fourteen superposed subcylindrical or somewhat flattened cells, almost or quite opaque and indistinguishable, the series usually bent backwards at the base and, more abruptly, at the apex. Of these cells the three (rarely four) basal ones bear no appendages; above these one to three cells may bear fertile appendages, and are in turn succeeded by one, rarely two cells, from which are produced single perithecia; above these follow two to four cells without appendages, while the series is completed by five or six distal cells bearing short stout sparingly branched tapering hyaline sterile appendages. Fertile appendages hyaline, sparingly branched, the antheridia irregularly placed. Spores very slender and sharply pointed  $37 \times 1-1.5 \mu$ . Perithecia (including basal cells)  $90-130 \times 22 \mu$ ; stalk cells about  $30 \mu$  long by  $18.5-22 \mu$  distally,  $11 \mu$  wide at base. Total length of receptacle  $150-165 \times 7.5-8 \mu$ . Appendages (longer) about  $50-60 \mu$ .

On abdomen of *Pinophilus latipes* Er., Southern States.

## RHADINOMYCES, nov. gen.

Receptacle consisting of two superposed cells, from the upper of which arise one to several stalked perithecia and an antheridial appendage. The appendage consisting of a series of several superposed cells, each of which may bear from its distal end one or more short fertile branches producing flask-shaped antheridia more or less irregularly: the distal cell of the series terminated by one or more long sterile branches. Perithecia subconical, borne on a stalk made up of a single basal cell surmounted by several smaller cells. Spores as in other genera.

Two well marked species corresponding exactly in essential characters seem to distinguish this genus from the allied *Corethromyces*. In both the appendage consists of three superposed cells, though this number may prove variable. The fertile branches consist of two or three small cells bearing the antheridia more or less irregularly, and

arise from small cells cut off from the upper corners of the cells of the appendage, more commonly on the inner side, sometimes on both. Rarely a similar fertile branch may arise at the base of the appendage.

*RHADINOMYCES PALLIDUS*, nov. sp.

Hyaline becoming yellowish or faintly brownish. Perithecium elongate, distally subconical, bluntly pointed. Appendage consisting of three superposed cells, the distal bearing one to three or four stout tapering flexuous branches. Spores  $50-55 \times 3.5-4 \mu$ . Perithecia  $110-185 \times 35-40 \mu$ . Receptacle  $37-55 \times 20-30 \mu$ . Primary appendage  $50-200 \mu$ , its branches (longest)  $350-375 \mu$ . Stalk of perithecium (larger)  $90-110 \times 25-30 \mu$ .

On *Lathrobium punctulatum* Lec. and *L. angulare* Lec., Massachusetts. On *L. fulvipenne* Grav., Germany.

The European specimens of this species, though distinctly larger than the American, correspond in all essential characteristics. The receptacle may rarely produce three perithecia, two being not uncommonly present.

*RHADINOMYCES CRISTATUS*, nov. sp.

Perithecia nearly hyaline or slightly yellowish, blunt, tapering slightly, its stalk elongate. Appendage stout and long, its distal cell bearing a crest-like series of three to six or more dark reddish brown rigid, straight, erect, simple, cylindrical branches. One or more similar branches may also arise from the distal end of the middle cell of the receptacle. Spores  $50 \times 4 \mu$ . Perithecium  $110 \times 32 \mu$ ; its stalk (longest)  $280 \times 19 \mu$ . Receptacle (largest)  $165 \times 28 \mu$ . Main appendage (largest)  $185 \times 19 \mu$ ; its branches (longest)  $350 \mu$ .

On *Lathrobium nitidulum* Lec., Kittery, Maine, and Cambridge, Mass.

*CORETHROMYCES*, THAXTER.

In addition to further material of the type species of this genus, several allied forms have been obtained, two of which are described below. Although these correspond in structure to the type, they furnish data which indicate that the limitation of the receptacle to the basal cells (apparently always two) from which the perithecium and the compound appendage were considered to arise directly, cannot be correct, from the fact that a second perithecium is not infrequently developed above the first from the basal cell of the supposed appendage. The main, usually black and opaque, portion of this structure

must therefore be considered the distal portion of the receptacle from which the appendages proper arise. The antheridia appear to be represented by certain short hyaline branches of the inner appendage, but their exact nature cannot well be made out from the dried material. The trichogyne is at first terminal and is well developed.

CORETHROMYCES CRYPTOBII, Thaxter.

Specimens occurring on *Cryptobium bicolor* Grav., from Pennsylvania, show that the mature perithecium is very elongate, exceeding the tips of the appendages by about half its length, subcylindrical, slightly inflated at the base, the apex abruptly conical, blunt symmetrical: borne on a stalk consisting of a single basal, two sub-basal, and a few small distal cells, on which the perithecium is seated. Perithecium  $240 \times 38 \mu$ , its stalk  $145 \times 26 \mu$ ; basal cell hyaline brown at base, the remaining cells together with the perithecium reddish brown.

CORETHROMYCES SETIGERUS, nov. sp.

Perithecium yellowish, slender, slightly tapering, bluntly pointed: basal cell of stalk hyaline to its base, long; sub-basal cells squarish. Appendages arising from the distal and sub-distal cells of the receptacle, consisting of two or three rounded basal cells, which bear numerous long straight cylindrical septate deep brown branches, the whole curved slightly outwards and forming a crest-like structure. Receptacle consisting of five superposed cells, the four distal ones more or less rounded or squarish, deeply blackened externally, bent outwards at an angle of  $45-60^\circ$ , the perithecium with its stalk cells continuing directly the axis of the basal and sub-basal receptacle cells. Perithecia  $110 \times 35 \mu$ . Spores (measured in perithecium)  $30 \times 4 \mu$ . Total length of appendages  $200 \mu$  or more. Two basal cells of receptacle  $35 \times 15 \mu$ . Total length from base to tip of perithecium  $200-220 \mu$ .

On thorax of *Lathrobium nitidulum* Lec., Massachusetts.

This is a much smaller species than *C. Cryptobii*, at once distinguished by its short primary and very long secondary appendages, the series of which recalls that of *Laboulbenia cristata*.

CORETHROMYCES JACOBINUS, nov. sp.

Perithecia (not fully mature) faintly brownish, nearly hyaline, tapering to a blunt apex. Appendages consisting of two more or less suffused basal cells, from which arise several stout branches them-

selves once or twice branched, the branches as a whole diverging slightly, the inner members of the group hyaline, the outer more or less deeply suffused with brown. A few additional short simple branches may also arise from the tip of the distal cell of the receptacle. Receptacle completely suffused and almost opaque, except the basal cell, which is hyaline with a basal brown suffusion. Perithecia  $75 \times 22 \mu$  (not quite mature). Total length of appendages  $160 \mu$  or more. Two basal cells of receptacle  $38 \mu$ . Total length to tip of perithecium  $150 \mu$  or more.

On upper surface of abdomen of *Lathrobium jacobinum* Lec., California.

This species is closely related to the preceding, from which it differs by its proportionately larger opaque receptacle, as well as by the character of its appendages, the main axes being more highly developed though less clearly marked than in *G. Cryptobii*.

#### TERATOMYCES, nov. gen.

Receptacle consisting of several superposed cells surmounted by a series of smaller cells which surround certain central cells, from which the perithecia arise, and produce distally a circle of appendages from within which the long stalked perithecium is exerted. Perithecia one or more in number, symmetrical, the stalk consisting of an elongate basal and three distal cells. Appendages consisting of one or more superposed cells, each producing externally a single row of branches. Spores as in other genera.

The dense tuft of appendages in this singular genus completely obscures the base of the stalk of the perithecium so that the structure in this region cannot be made out. The appendages are quite different in character from those of other described genera, the flattened basal or sub-basal cells being closely set externally with peculiar branches corresponding in position to zigzag depressions of the outer surface of such cells. What the limitations of the generic characters may prove to be it is difficult to determine. The antheridia may be represented by short hyaline branches, at the tips of the appendages.

#### TERATOMYCES MIRIFICUS, nov. sp.

Receptacle consisting of three (?) superposed cells, the basal one slender, its upper portion opaque and indistinguishable from the cell above it, which is also almost wholly opaque with a partly hyaline

rounded prominence on one side; the third cell of the series is symmetrically expanded upwards, large and broad, more or less tinged with brown and surmounted by the circle of appendage bearing cells (about fifteen in number), which are more or less irregular in size and subtriangular in outline. The appendages consist commonly of a single large long slender flattened cell, its external surface bearing very numerous branches succeeding one another in a single vertical row, the lowest ones simple, beak-like, curved outwards; others higher up bearing beak-like branchlets, while certain of the upper branches may resemble the main cell from which they arise, and like them bear one or more terminal branchlets which may in turn be more or less copiously branched, the whole forming a dense tuft about the stalk of the perithecium of very complicated structure. Perithecia, one or two in number, arising from cells indistinguishable within the circle of appendages, straight, basally slightly inflated, distally subcylindrical and tapering abruptly to a symmetrical truncate apex; borne on a very elongate stalk which raises them far above the appendages and consists of a cylindrical very long basal cell terminated by three cells, one as long as and opposite the other two. Spores  $40 \times 4 \mu$ . Perithecia  $120-140 \times 22-26 \mu$ . Stalk (longest)  $480 \mu$ . Appendages (longest)  $185 \mu$ . The main basal cell (longest)  $130 \mu$ . Receptacle  $110-130 \mu$  long; width at base  $7.5 \mu$ , at apex about  $45 \mu$ .

On abdomen of *Acylophorus pronus* Er., Massachusetts; *A. flavicollis* Sachs, Pennsylvania.

#### DICHOMYCES, nov. gen.

Receptacle flattened, bilaterally symmetrical, multicellular above a narrow stalk cell, terminated by two clearly defined transverse rows of cells: the sub-terminal cells of the lower row modified to form, anteriorly, single projecting tooth-like antheridia: the upper series bearing a pair of perithecia and several sterile appendages all symmetrically arranged. Appendages as in *Peyritschiella*, simple, cylindrical. Perithecia symmetrical.

This genus is closely allied to *Peyritschiella* from which it is distinguished by its bilateral symmetry and the constant presence of a pair of perithecia reaching maturity simultaneously. In the above description the term *anterior* is applied to the slightly convex side from which are produced the two short and sharp projections which are analogous to the single similar projection found in *Peyritschiella*, and represent highly developed single antheridia.

*DICHOMYCES FURCIFERUS*, nov. sp.

Receptacle consisting of a small basal cell, which is nearly hyaline distally and suffused with brown basally, the receptacle above gradually expanding into a more or less fan-like form, the basal portion wholly black and opaque, the opacity extending upwards externally and including a prong-like projection which extends above the base of the perithecium and terminates the sub-distal row of cells on either side; the latter, seven in number, becoming generally suffused with blackish brown, the long rectangular central cell usually more or less distinct, the remainder partly or wholly opaque and indistinguishable: the antheridia lighter brownish. The distal row of cells seven in number, their septa straight, thin, and clearly defined; the middle cell of the series bearing distally two appendages, placed antero-posteriorly, the terminal cells of the series on either side also bearing two appendages, the inner slightly anterior. Perithecia bent slightly forward, tapering very slightly to the blunt apex, which bears a short recurved tooth-like projection on either side. The perithecia and distal row of cells faintly purplish. Appendages short, simple, hyaline, cylindrical, with a constricted blackish base. Perithecia  $63 \times 16-18 \mu$ . Receptacle: length to base of perithecia about  $90 \mu$ ; to tips of external projections  $100-120 \mu$ ; greatest width  $55-60 \mu$ .

On abdomen of *Philonthus debilis* Grav., Massachusetts.

A most singular plant looking like a two-pronged fork between the black arms of which arises the pair of perithecia. The lower portion of the receptacle is so opaque that the cell structure is indistinguishable.

*PEYRITSCHIELLA NIGRESCENS*, nov. sp.

Receptacle consisting of a single basal nearly hyaline cell, followed by three elongate sub-basal cells; the two outer suffused with blackish brown, externally opaque: above these follow two successive more or less irregular transverse rows of cells, the lower terminated on one side by a slight prominence close beside the sharp brownish projection (antheridium) characteristic of the genus, a single appendage also arising near the base of this projection. The upper distal row of cells, five in number, ending on one side in a small cell which bears a single appendage above the antheridium, while at the other end the series is terminated by a large cell forming a broad prominence indistinctly divided into about five small cells and bearing a group of four appendages. Appendages short, hyaline, cylindrical. Perithecia  $65 \times 19 \mu$ . Receptacle  $70 \times 37 \mu$ . Total length  $130 \mu$ .

On leg of *Philonthus debilis* Grav., Massachusetts.

This well marked species is easily separated from the two previously described by its blackish suffusions and the arrangement of its appendages. It is smaller even than *P. minimus*, and bears a superficial resemblance to *Dichomyces furciferus*.

HEIMATOMYCES BOREALIS, nov. sp.

Hyaline or slightly yellowish. Perithecium large and stout, its distal half or more free from the receptacle, tapering slightly to the large blunt apex. Sub-basal cell of the receptacle small and flattened: the distal portion of the receptacle composed of only three cells (the fourth obsolete or very minute), the distal one large, longer than broad, its base very oblique, the two others very long and subtriangular, the septum between them running obliquely from the insertion of the "trichogyne" nearly to the base of the inner cell. Perithecia  $80-90 \times 22 \mu$ . Receptacle, total length  $75-80 \mu$ ; length to tip of perithecium  $110-120 \mu$ .

On legs of a minute water beetle, Kittery, Maine.

This species differs from those previously described by the absence of the fourth cell in the distal portion of the receptacle. It is related to the succeeding species in its cell arrangement, but is easily separated by its greater size, the relative position and shape of the perithecia, etc. The ascogenic area is also external, a position which seems exceptional.

HEIMATOMYCES BIDESSARIUS, nov. sp.

Hyaline becoming faintly tinged with blackish. Perithecium small, its upper third or fifth free from the receptacle, the apex bent outwards, the basal portion straight, the tip broad with large prominent lips. Receptacle stout, the two basal cells more nearly equal, the two cells above these longer than broad and nearly equal; distal portion nearly as in *H. borealis*, the base of the short terminal cell horizontal. Perithecia  $40-48 \times 15 \mu$ . Receptacle  $65 \mu$  long. Total length to tip of perithecium  $80 \mu$ .

On elytra of *Bidessus granarius* Aube, Kittery, Maine.

CERATOMYCES, THAXTER.

The six additional species of this genus, five of which are described below, represent a peculiar and well marked type. The two species

described as *C. furcatus* and *C. contortus*, together with a third related form as yet undescribed, differ from other members of the genus in the much smaller number of cells in each of the four cell rows composing the wall of the perithecium, although the number, which finds its maximum in *C. rostratus*, is also very greatly reduced in *C. minisculus*. The spores of the two first mentioned species are also peculiar, in that the septum also divides the hyaline envelope. In all the species the trichogyne arises from the angle formed between the perithecium and the antheridial appendage. In a few specimens two perithecia arise side by side, each associated with an appendage; but this condition seems decidedly exceptional. It should be observed also that two species, *C. rostratus* and *C. capillaris*, are without the perithecial appendage peculiar to the remaining species.

CERATOMYCES CONTORTUS, nov. sp.

Hyaline becoming very faintly brownish. Receptacle consisting of three superposed cells above which three cells form the general base of the perithecium and appendage. Perithecium long and slender, usually constricted at the base, slightly inflated and bent outwards, the apex pointed and curved. A short appendage arises sublaterally below the apex and is strongly curved, extending inwards beyond the apex, its fifth and sometimes also its sixth cell producing from its upper surface a stout branch which may be simple or may bear a few secondary branches at irregular intervals. Antheridial appendage consisting of about twelve superposed cells, producing a few branches from its inner side at irregular intervals, the branches in turn more or less irregularly branched. Spores  $80-85 \times 3-3.5 \mu$ . Perithecia  $200-260 \times 35-45 \mu$ . Receptacle about  $125 \mu$  long. Antheridial appendage  $110-130 \mu$ . Perithecial appendage  $75 \mu$  long.

On inferior surface of abdomen of *Berosus striatus* Say, Maine.

CERATOMYCES FURCATUS, nov. sp.

Hyaline becoming more or less suffused with reddish brown, the appendages sometimes purplish. Receptacle composed of three or four superposed cells, surmounted by two cells from which arise the perithecium and appendage. Perithecium large and stout, externally nearly straight, inwardly inflated and strongly curved to the pointed apex below which arises externally and sublaterally a large stout flexed appendage, tapering and bearing towards its tip a single row of short branches which may be in turn once branched. Cell rows of perithe-



cium each consisting of about eight cells. Antheridial appendage very large, consisting of twenty cells (more or less) bearing branches at irregular intervals from its inner surface. Spores  $85-90 \times 4 \mu$ . Perithecia  $130-150 \times 45-60 \mu$ . Receptacle  $90-110 \times 45-55 \mu$ . Antheridial appendage  $300-425 \mu$ . Perithecial appendage about  $325 \mu$ .

On inferior surface of thorax of *Berosus striatus* Say, Maine.

CERATOMYCES MINISCULUS nov. sp.

Becoming more or less deeply tinged with reddish brown. Receptacle consisting of about three superposed basal cells, all blackened opaque and indistinguishable, surmounted by a few small cells partly blackened below, from which arise the appendage and perithecium. Perithecium subconical, ten or eleven cells in each cell row, a short blunt conical unicellular projection borne sublaterally below the tip which is usually curved slightly outwards. Appendage tapering to a slender tip, simple, or bearing a few short branches near its apex, seldom as long as the perithecium. Spores  $75 \times 4 \mu$ . Perithecia  $110-150 \times 30-40 \mu$ . Receptacle, average,  $90 \times 40 \mu$ . Appendage  $50-110 \mu$  long.

On the edge of the elytra of *Tropisternus nimbatus* Say, Maine, Connecticut, Texas.

CERATOMYCES FILIFORMIS, nov. sp.

Suffused with reddish brown. Receptacle consisting of three superposed cells, the basal one partly blackened, surmounted by two cells which form the origin of the perithecium and antheridial appendage. Perithecium very long and slender, nearly cylindrical, tapering abruptly and symmetrically to the subtruncate apex, the cell rows composed of very numerous cells (maximum forty five). Appendage short, tapering, straight, bearing terminally or subterminally one or two slender branches. Spores  $55-60 \times 3 \mu$ . Perithecia  $250-330 \times 33-40 \mu$ . Receptacle  $35 \times 85 \mu$ . Appendage  $90 \mu$ .

On the edge of the elytra of *Tropisternus glaber* (Hb.) and *T. nimbatus* Say.

This species was at first taken for an abnormal form, but sufficient material shows that it is a well marked species. It occurs near the tip of the elytron, and is with difficulty distinguished from the bristle-like hairs among which it occurs. It is remarkable for the very small number of spores present in the perithecium.

**CERATOMYCES ROSTRATUS, nov. sp.**

Reddish brown. Receptacle long, slender, expanding slightly upwards, consisting of about twelve superposed cells. Perithecium consisting of a clearly distinguished neck and an inflated oval basal portion, completely filled with spores and asci, which pushes the appendage to one side and continues directly the axis of the receptacle; the neck very elongate, irregularly cylindrical, its terminal portion at maturity abruptly bent upon itself, the recurved portion tapering slightly to the hunched asymmetrical apex: the cell rows made up of seventy cells, more or less. Appendage arising from a broad base flattened at maturity by pressure from the base of the perithecium consisting of about six superposed cells bearing numerous branches which may in turn be several times branched. Spores about  $75 \times 3.5 \mu$ . Perithecia, basal portion,  $110-150 \times 65-90 \mu$ ; neck, including recurved portion, longest, 1.17 mm. Appendage about  $90-100 \mu$  long, its longest branches about  $200 \mu$ . Receptacle, large, about  $260 \mu$  long by  $55 \mu$  at the distal end.

On the inferior surface of *Hydrocymbus fimbriatus* Melsh, Massachusetts, Texas; *Philhydrus cinctus* Say, Maine.

The most remarkable species of the genus, the enormously elongated neck of the perithecium becoming hooked only in fully mature specimens, and serving an evident purpose in the spore dissemination.